International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.1 pp 356-366, 2017

Correlation between DepotmedroxyprogesteroneAcetate (DMPA) Use and Bone Mineral Density in Reproductive Women Age

Muhammad Alamsyah Aziz[1]*, Dudy S.N. [1], Tono Djuwantono[1], SofieRifayani Krisnadi[2], Udin Sabarudin[1],Wiryawan Permadi[1], Riesa K. W. Rohmat[1]

[1]Obstetrics and Gynecology, Faculty of Medicine, University of Padjadjaran, Hasan Sadikin Hospital, Indonesia
[2]Reproductive Health Study Center of Universitas Padjadjaran, Indonesia

Abstract : Background: Depomedroxyprogesteron acetate (DMPA) is the most popular contraception in the world. The used of this contraception can be caused osteoporotic. Objective this research was to compare the bone mineral density (BMD) of DMPA users and non-users, and its correlation with the length of use DMPA.
Methods: Cross-sectional study was done on 32 DMPA users and 31 non-users as control, who met the inclusion criteria, at Department of Obstetrics and Gynecology Hasan Sadikin General Hospital, from January to December 2005. To be noted: age, height, weight, body mass index (BMI), marital age, parity, graduated marital status, and ethnicity. Analysis was done by chi-square test, t-test, exact Fisher test, Mann-Whitney test, and rank Spearman correlation analysis.
Results: Characteristics of DMPA users were: (28.8 $\pm$ 4.9) years, height (154 $\pm$ 4.8) cm, weight (51.2 $\pm$ 7.1) kg, body mass index (21.5 $\pm$ 2.7) kg/m^2, marital age (20.8 $\pm$ 3.8) years, parity >1 (96.87%), senior high school (56.25%), married (96.87%) and sundanese (100%), and on the control group were: age (32.8 $\pm$ 4.2) years, height (154.3 $\pm$ 5.1) cm, weight (53.4 $\pm$ 9.7) kg, BMI (22.4 $\pm$ 3.7) kg/m^2, marital age (23 $\pm$ 3.4) years, parity >1 (87.1%), senior high school (51.62%), married (93.55%), and sundanese (100%). The characteristics in both groups were homogeneous ($p>0.05$). The average of BMD in both group was significantly different ($p<0.001$), (1.025 $\pm$ 0.394) g/cm^2 versus (1,184 $\pm$ 0.0166) g/cm^2. The difference between each measured value was 0.159 g/cm^2. The mean length of DMPA use was (54.8 $\pm$ 33.8) months and its correlation with bone mineral density (BMD) was significantly different ($p>0.05$). The correlation between DMPA use and BMD was very significant ($p<0.001$) in the youngest group (20-24 years), but there was no significant correlation between body mass index (BMI) and BMD ($p>0.05$).
Conclusions: BMD in DMPA users is lower than that in non-users. There is no correlation between the length of DMPA use and the BMD.
Keywords: DMPA users, BMD, length of DMPA use.

Introduction

The new paradigm of National family planning program has changed its vision of realizing Small, Happy, and Prosperous Family became a vision to create quality family in 2015. Good quality family is a family that prosperous, healthy, progressive, independent, have the number of children ideal, forward-looking, responsible, harmonious, and devoted to God Almighty.[1]

That vision is translated into six missions, namely: [1] 1) Empowering people to build a small family of quality, 2) Promote partnership in improving the well-being, independence and resilience of families, 3) Improving the quality of family planning (FP) and reproductive health, 4) Increasing the promotion, protection, and efforts to achieve reproductive rights, 5) Improving women's empowerment to bring about equality and gender justice through family planning programs, and 6) Preparing qualified human resources since conception in the womb until old age.

Based on the vision and mission of the family planning program is an effort to preventive health care of the most basic and primary. To optimize the benefits of family planning for health, then the service should be combined with reproduction health care.[1] Prevention of maternal morbidity and mortality is the main reason the need for family planning services. There are still many other reasons, such as freeing women from worry to the occurrence of unwanted pregnancy, physical or psychological disorders occur due to the actions of unsafe abortion, as well as the demands of social development towards improving the status of women in society.[1]

Based on the 2000 population census, the total population in Indonesia reached 205.8 million and increased to 211.1 million in 2002, it is a challenge in reducing the rate of citizen growth.[2] Neither the residents of West Java in 1999 amounted to 42.5 million people[3] and is estimated to be 46.9 million in 2005.[3] Based on demographic and health survey of Indonesia in 2002-2003 in line with the increase of population there is an increasing trend among users of contraception injection married woman from 11.7% (1991), 15, 2% (1994), 21.1% (1997), and increased to 27.8% (2003) .2,3 Use of contraceptive injection nationally reached 57.46% in 2005.3 in West Java Province acceptors increased from 51% (1991) to 59% (2002-2003). Contraceptive injection method of contraception most widely used in Indonesia. Contraceptive injection that contains only progesterone alone (Depo-Provera) is a method of contraception most widely used in the amount of 94% of the total of all contraceptive injection users.[2,3]

None of contraceptive methods that are safe and effective for all acceptors, because each has its appropriateness and suitability of different individual for each acceptor. In general terms a method of contraception ideal is as follows: safe use and trustworthy, adverse side effects do not exist, the old works can be arranged according to desire, does not interfere with intercourse, it does not require immediate medical or strict control over use, how to simple use, low cost in order to reach the wider community, and can be received by the spouse.[4]

Hormonal contraceptives types of injections in Indonesia has been increasing use for their effective, practical use, relatively inexpensive and safe. In this way began favored by our society and an estimated half million couples use contraceptive injections to prevent pregnancy (1983).[3,4]

Depot medroxyprogesterone acetate (DMPA) is the first progesterone contraceptives are popular and used more than nine million women in the world. DMPA was originally introduced in the early 1960s, is used in patients with recurrent miscarriage and preterm labor.[5] Introduced commercially in 1967, is a type of contraception most widely studied, initially caused controversy because animal studies are often associated with the onset of malignancy. The use of this method as a new contraceptive allowed in the United States in 1992.[5] The results of the use is safe, efficacy and acceptable for long periods of time as hormonal contraceptives are known from studies in Indonesia, Sri Lanka, Thailand, and Mexico that Depo-Provera has been used and studied for some time.

Effect of injection contraceptive DMPA on bone mineral density is believed to increase the incidence of osteoporosis, especially in women between 35-40 years old will have decreased bone mineral density (BMD)[6-9] and lost about 40-50% all amount of bone density in their body.[11-12] Osteoporosis is a major health problem in the world[13,14] because financing is expensive and morbidity (morbidity) and death (mortality) showed a significant increase is expected in the United States alone accounted for approximately 25 million inhabitants. Currently there is no national data in Indonesia.[5,15]

DMPA is a microcrystalline, dissolved in a liquid (aqueous solution)[16-18]. The right dose for the purpose of contraception is 150 mg intramuscular (gluteal or deltoid) every three months. A comparative study conducted at a dose of 100 mg was less effective. Can be used as a contraceptive up to 14 weeks, provided a safe margin for effective contraception, approximately one pregnancy per 100 women after five years in consistent use.[15,19]

DMPA injection contraception work primarily by pressing the gland gonadotropin secretion of the pituitary gland, which prevents ovulation. Blocking the road ovulation by suppressing the formation of LH-RH (luteinizing hormone- releasing hormone) and FSH-RH (follicle stimulating hormone-releasing hormone), changing the cervical mucus to become thick thereby inhibiting sperm penetration and cause changes in the endometrium making it impossible happforimplantion to happen. It is also changing the transportation speed of the ovum through tuba.[4-5,15] Ovarian estrogen production is also suppressed, long-term use have characteristics of plasma estradiol levels that are at or below the current level of the follicular phase. Relative estrogen deficiency is associated with a loss of inhibitory effect of estrogen on bone resorption, which may cause harmful effects to the bone density.[15]

Referring to the multicenter that women who did not use hormonal contraception have a bone mineral density higher than that using hormonal contraceptives, such as a study conducted in New Zealand get a reduction in bone mineral density in women who use injection DMPA, this situation is also greatly influenced by the characteristics, activity, family history of osteoporosis, alcoholism, smoking, and specific metabolic diseases.[5] But other studies have also found that the measurement of bone mineral density of women who stopped taking Depo-Provera, bone loss was recovered after a period of approximately 2-3 times used.[15]Years after cessation of cross-sectional study in Thailand found no decrease in bone mineral density in the long term (over three years) in the usage of Depo-Provera,[6,20] but prospective studies that have been done show that the decrease in density bone mineral untrue in Depo-Provera users,[21] other studies find even a bone mineral density remained stable after 6 months of use DMPA.[21]

Method

The sample was women aged 20-40 years who have fulfilled the inclusion and exclusion criteria for the study who come to the family planning clinic Hasan Sadikin General Hospital during the study period, and willing to participate in the study after given an explanation. The sample size was calculated based on the rule of rule of thumb for any variables that will be involved in a multiple regression analysis of at least 10, because the results of the independent variable, dependent variable, other variables, the at least one selected sample size is 30 for each each group, so that the total number of samples is 60. To reduce confounding bias in sample selection based on the research carried out matching the characteristics and body mass index (BMI).

Every woman who comes to FP Polyclinic Hasan Sadikin General Hospital and meet the criteria for inclusion and exclusion, given the description of the research to be conducted. If willing to participate in the study, then told they were asked to sign a consent form provided. Then patients are managed in accordance with the working procedures of the research:

Interviews were conducted using a questionnaire guide has been created for women aged between 20-40 years. Do anamnesis whether a woman still using contraceptive DMPA injection on a regular basis a minimum of six months then the woman performed bone mineral density measurements by using densitometry.[22,23]

Height measurement is done in a standing position using MMT brands altimeter, height is measured from the top of head to foot medial part.Weight measurement is done in a standing position with Mitseda capacity of 120 kg.Body weighing device has previously been carried out calibration.

Having collected a group of women who use contraceptive DMPA injections performed search group of women who did not use contraception DMPA injections that have the same characteristics and BMI, and then do the same history and examination.

Examination using Oracle Lunar densitometer brands 2003

Prior to this research, densitometer calibration has been carried out, with a test calculation bone mineral density measurements on 10 patients, and the results are repeated and the same results were obtained. Operator during the study are officers who have been trained using a densitometer and have a certificate. Test results read by the researcher is assisted by an expert in the disease who have experienced clinically.

All data is recorded in the master table and incorporated into the data base files. Data processing is performed by using a computer and displayed in the form of distribution and tabulation, statistical analyzes were performed using the SPSS 10.0, a score t and z scores for reasons more sensitive and simple and commonly used.

Data were recorded in a data form which has been prepared, then the data is compiled in a data base. Data tabulation conducted in accordance with the purpose of research and will be processed by using statistical data processing program SPSS version 10.0.

To compare the characteristics between the two study groups used the chi squared (x^2, chi-square), t-test, Fisher's exact test while to compare the mean values of bone mineral density in both groups for normal distribution of data used t-test analysis (t-test) and not normal distribution using the Mann-Whitney test. To determine the relationship between age, body mass index, duration of use of DMPA on bone mineral density used Spearman rank correlation analysis. Significance is determined based on the value of $p < 0.01$ highly significant, $p < 0.05$ significant, and $p > 0.05$ was not statistically significant.

Result

Research on the relationship between contraceptive use DMPA injection and bone mineral density of women of reproductive age have been conducted over a period of 12 months, from January 2005 to December 2005. During this period the sample obtained as many as 32 women of reproductive age who use DMPA injection and 31 DMPA non-acceptor women as a control group, who met the inclusion criteria. The whole subject of this study measured bone mineral density using a Lunar prodigy oracle bone densitometer.

Characteristics of this special study are presented in Table 4.1 below. Based on the characteristics of the study subjects in the group obtained a mean age is 28.8 years DMPA injection acceptors, 4.9 standard deviation range 19-37 years, mean height 154.3 cm, with a 4.8 standard deviation range of 142-164 cm, the mean weight 51.2 kg, 7.1 standard deviation range of 40-70 kg, the mean BMI of 21.5 kg/m^2, the standard deviation of 2.7 with a range of 17 to 28.8 kg/m^2, the mean age of marriage 20.8 years, standard deviation of 3.8 with a range of 11-30 years, most have had children (96.87%), the majority of senior high school education (56.25%) and married (96.87%).

In the group non-acceptor DMPA injection (control group) the average age is 32.8 years, standard deviation 4.2 with an age range 24-39 years, the average height is154.3 cm, the standard deviation is 5.1 with a range of 145-170 cm, the mean weight 53.4 kg, with a 9.7 standard deviation range of 37-73 kg, the mean BMI of 22.4 kg/m^2, the standard deviation of 3.7 with a range of 15.6 to 31.2 kg/m^2, the mean age of marriage 23 years, standard deviation of 3.4 with a range of 13-30 years, most have had children (87.1%), the majority had senior high school education (51.62%) and married (93.55%). The whole subject of research both DMPA injection acceptor group and the control group was from the sundanesetribe (100%).

Table 1Characters of research subject

Characteristic	Injection Acceptor DMPA (n=32)	Non-acceptor DMPA (n=31)	Significance
Age (year)			
< 34	26	18	
> 35	6	13	$x^2 = 2.99$
X (SB)	28.8 (4.9)	32.8 (4.2)	p = 0.084
Range	20-37	24-39	
Body Height (cm)			
X (SB)	154.3 (4.8)	154.3 (5.1)	t = 0.03
Range	142-164	145-170	p = 0,974
Body Weight (kg)			
X (SB)	51.2 (7.1)	53.4 (9.7)	t = 0.99
Range	40-70	37-73	p = 0.328
Body Mass Index			
Underweight (<20)	8	7	
Normoweight(20-25)	21	18	
Overweight (26-30)	3	5	t = 1.06
Obesity (>30)	0	1	p = 0.294
X (SB)	21.5 (2.7)	22.4 (3.7)	
Range	17.0-28.8	15.6-31.2	
Age on Marriage (year)			
< 24	26	20	
> 25	6	11	$x^2 = 1.47$
X (SB)	20.8 (3.8)	23.0 (3.4)	p = 0.225
Range	11-30	13-30	
Parity			
0	1 (3.13%)	4 (12.9%)	$p_{EF} = 0.196$
>1	31 (96.87%)	27 (87.1%)	
Education			
Elementary	2 (6.25%)	0	$x^2 = 5.703$
Middle	9 (28.12%)	6 (19.35%)	p = 0.127
High	18 (56.25%)	16 (51.62%)	
Higher Education	3 (9.38%)	9 (29.03%)	
Marriage Status			
Married	31 (96.87%)	29 (93.55%)	$p_{EF} = 0.613$
Widow	1 (3.13%)	2 (6.45%)	
Tribe			
Sundanese	32	31	-

Note: X (SB): mean and standard deviation

Statistical analysis: x^2 = *chi square test*; t= t test; p_{EF}= Fisher's exact test

The chi square test, t-test and Fisher's exact test used to compare the characteristics between the two study groups. Statistical test to all the characteristics of the two groups obtained a significant difference (p>0.05) means that the two groups have homogeneous characteristics, so that the research can continue.Further statistical tests performed was to compare the mean values of bone mineral density in both study groups to know the factors that were related to bone mineral density.

Comparison of Bone Mineral Density in the Second Research Group

The group that received injections of DMPA had a mean bone mineral density is lower when compared to the group that non-acceptor DMPA injection (control group) on the subject of this study. Table 2 shows the average bone mineral density in the acceptor group DMPA injection was 1.025 g/cm^2, with a standard deviation

of 0.094 g/cm^2, mean T-score of -0.694, 0.832 standard deviations of the median value of -0.7. The average value Z score of -0.766, with a standard deviation of 0.832 with a median value of -0.7. The average value of bone mineral density in the group non-acceptor DMPA injection (control group) was 1.184 g/cm^2, the standard deviation of 0.0166 g/cm2, mean T-score of 0.458 standard deviation of 0,960, the median value of 0.30 and the mean Z score of 0,339, standard deviation of 0.957 with a median value of 0.2. The difference in mean difference in bone mineral density in both groups of 0.159 mg/cm^2 and it is statistically demonstrated highly significant difference ($p < 0.001$).

Table 2 Comparison of the mean bone mineral density, a T score, and score Z

Mean Comparison	Acceptor DMPA injection	Non-acceptor DMPA injection	Significance
Bone Mineral Density X (SB) Range	 1.025 (0.094) 0.839-1.218	 1.184 (0.0166) 1.003-1.830	 t = 4,69 p < 0.001
BMD result Osteopenia (0,8-1g/cm^2) Normal (>1g/cm^2)	 14 (43.75%) 18 (56.25%)	 - 31 (100%)	 p < 0.001
Score T X(SB) Median Range	 -0.694 (0.832) -0.7 -2.6-0.8	 0.458 (0.960) 0.30 -0.9-3.1	 Z_{M-W} = 4.404 p < 0,001
Score Z X (SB) Median Range	 -0.766 (0.832) -0.7 -2.6-0.8	 0.339 (0,.57) 0.2 -2.1-2.0	 Z_{M-W} = 4.273 p < 0.001

Note: t = t test; Z_{M-W} = Mann-Whitney test

DMPA injection on the acceptor group obtained 43.75% of the study classified as osteopenia, whereas the control group obtained all have a bone mineral density were classified as normal and statistically highly significant ($p < 0.001$).Figure 1 shown the scatter diagram comparing bone mineral density (BMD) between DMPA injection acceptor group and the control group.

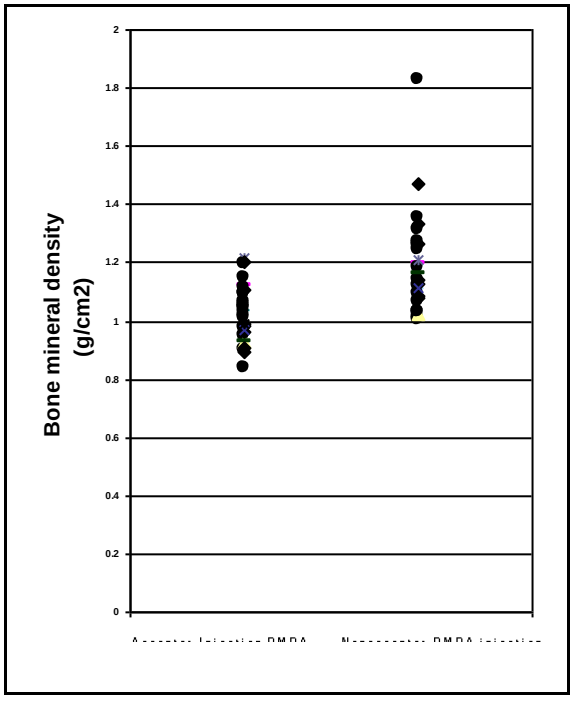

Figure 1 scatter diagram comparing bone mineral density (BMD) between DMPA injection acceptor group and the control group

Relationship Age, body mass index, and duration use of DMPA with Minera Bone Density Research Subjects

In the table below will be described on the relationship of age, body mass index (BMI), and duration of use of DMPA with bone mineral density (BMD) on the entire subject of research. To determine the relationship between the two is used Spearman rank correlation analysis.

Table 3 shows the relationship of age, body mass index, and duration of use of DMPA with bone mineral density in both groups. By using the Spearman rank correlation coefficient rs 0.299 value obtained for the relationship of age with bone mineral density in the study subjects, the relationship showed a significant relationship ($p < 0.05$).

Table 3 Relationship between age, body mass index and duration of use of DMPA with bone mineral density research subjects

Correlation	Research Group	
	rs	P
Age withBMD	0.299	0.017
Age with T Score	0.323	0.010
Age with Z Score	0.267	0.034
BMIwithBMD	0.121	0.346
BMIwith T Score	0.152	0.235
BMIwith Z Score	-0.139	0.278
DMPA Duration withBMD	0.208	0.254
DMPA with T score	0.012	0.245
DMPA with Z score	0.041	0.824
T Score with Z score	0.858	<0.01

Note: rs = rank Spearman correlation coefficient

In the table below are shown in relation to age groups with bone mineral density in DMPA injection acceptor group compared with controls.

Table4Age-groups relationship with bone mineral density

Age-Groups (Year)	BMD	DMPA	Non DMPA	T	P
20-24	X (SB) Range	1.4 (0.07) 0.95-1.108	1.83 1.83	10.89	<0.001
25-29	X (SB) Range	1.01 (0.10) 0.839-1.202	1.103 (0.009) 1.008-1,261	1.81	0.091
30-34	X (SB) Range	1.02 (011) 0.897-1.218	1.170 (0.148) 1.003-1.481	2.34	0.032
>35	X (SB) Range	1.05 (0.09) 0.963-1.195	1.185(0.096) 1.023-1.337	2.91	0.011

In Table 4shows that the difference in bone mineral density is very significant in the 20-24 years age group ($p < 0.001$), whereas significant difference was found in the age group> 30 years with $p < 0.05$. Statistical test results found no significant difference in the age group 25-29 ($p > 0.05$). This illustrates that in the younger age groups (under 25 years) who received injections of DMPA, which experienced the highest growth of bone, it shows a decrease in mineral density were highly significant compared to the control group. For more details can be seen in figure 2.

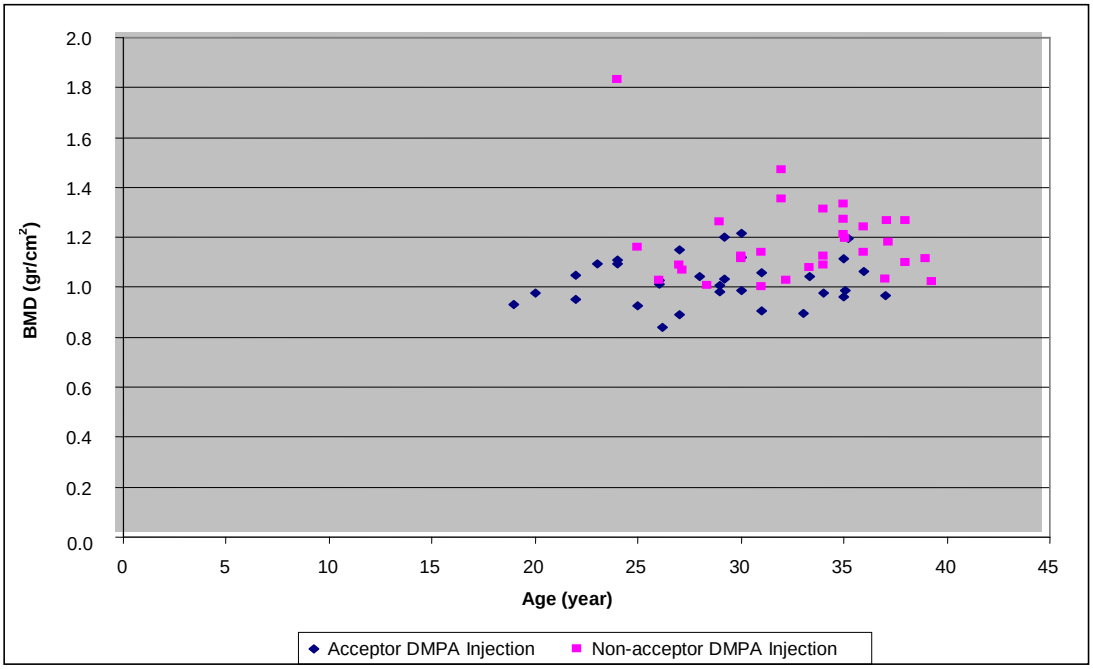

Figure2 Scatter diagram of the correlation between age and BMD

In Table 3 it appears that the relationship between body mass index (BMI) and bone mineral density in both study groups havers 0.121 and the value of statistical analysis showed no significant relationship (p> 0.05). The relationship between duration of use DMPA and bone mineral density values obtained rs 0.208 of statistical tests found no significant relationship (p> 0.05). In the group of DMPA injection acceptors known to the average duration of use of DMPA injection was for 54.8 months or 4.5 years with a standard deviation of 33.8 months, median 48 months, while the range of use of DMPA is one year up to 11 years. In the picture below scatter gram not seem long relationship between DMPA use and bone mineral density in DMPA injection acceptor groups, the relationship was not significant (p> 0.05).

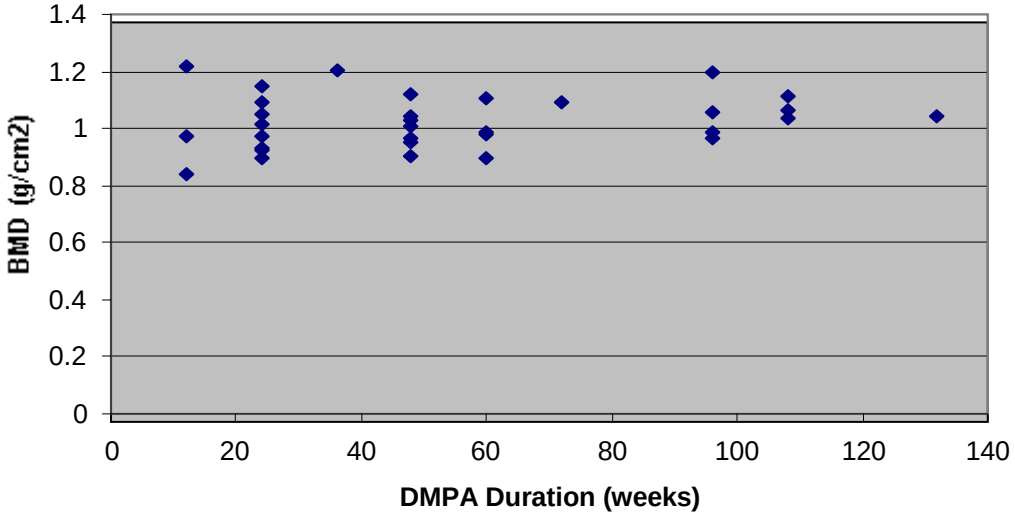

Figure 4.Scatter diagram of between the duration of DMPA use and bone mineral density acceptor DMPA injection group

Discussion

Characteristics of Research Subjects

The characteristic feature of this research subject can be seen from Table 1 the mean age in this study was 28.8 years in the group of acceptors of DMPA injection and 32.8 years in the group non-acceptor DMPA injection. The results of this research turned out to be almost the same as the studies that have been done before.

The mean weight at 51.2 kg group DMPA injection with a standard deviation of 7.1 and a weight range of 40-70 kg with a mean height of 154.3 cm with a standard deviation of 4.8 and a range of 142-164 cm. While on DMPA injection non-acceptor group obtained a mean weight 53.4 kg with a standard deviation of 5.1 and a weight range 37-73 kg with a mean height of 154.3 cm with a standard deviation of 5.1 and range 145-170 cm. Some studies suggest the average weight and height in women of reproductive vary. This indicates that the weight and height on the research subjects vary greatly depending race and socioeconomic status.

Body mass index is the subject of research on DMPA injection and acceptor groups non-acceptor DMPA injection (control group) did not differ much with a mean BMI in the group of 21.5 kg/$m^2$with a range of 17 to 28.8 kg/m^2, while the control group mean BMI 22, 4 kg/$m^2$with a range of 15.6 to 31.2 kg/m^2. It showed that the average BMI of the subject of this study is still in the normal range, although there are subjects with a body mass index below normal (underweight) or above normal (overweight and obese).

The mean age of marriage is almost the same in both groups, the group mean DMPA injection acceptors married at the age of 20.8 years with an age range 11-30 years of marriage, whereas the control group mean of 23 years with an age range 13-30 years of marriage.

Most research on the subject of injection DMPA acceptor groups have parity>1 (96.87%), high school education (56.25%), almost the same in the control group 87.1% had parity >1, and senior high school education (51.62 %). The whole subject of research has been married and comes from the Sundanese.

From the test results statistically using the chi square test, t test or the Fisher's exact test, differences in the characteristics of the two groups was not significant (p> 0.05) and is therefore known that the characteristics of both a homogeneous group, so that research can continue to compare the value of the average density bone mineral in both study groups and determine the factors that were related to bone mineral density.

Decrease in Bone Mineral Density and Use of DMPA in duration Effect Research Group

The mean bone mineral density (BMD) in the acceptor group DMPA injection was 1.025 (0.094) g/cm^2 with a range between 0.839 to 1.218 g/cm^2. Whereas in the group non-acceptor DMPA injection BMD average is 1.184 (0.0166) g/cm^2 with a range between 1.003 to 1.830 g/cm^2. From the data, the research note that the average bone mineral density in a group acceptor injection DMPA and control groups was within normal limits, but with a statistical test (t test and Mann-Whitney test) obtained difference significantly between the two study groups (p <0.001). This shows that use of DMPA injection within a certain time can cause a decrease in bone density that is very meaningful. Mann-Whitney test for scores T and Z scores showed no significant differences p <0.001.

The results of this study as ever conducted by Scholes *et al*[24] and Cundy*et al*[25] who get bone mineral density was lower in women using DMPA injection. The use of DMPA is associated with decreased bone mineral density that is very meaningful results on the measurement of bone mineral density in the femur and spine, with a difference of 2.5% between acceptor and a control group.

Long use of DMPA on the subject of this study, at least one year (12 months) and a maximum of 11 years (132 months). The average use of DMPA injection obtained in the study group for 4.5 years with a standard deviation of 2.8. In this research note that the long use of DMPA does not have a significant association with bone mineral density (p = 0.254) with rs 0.208. In the scatter diagram seem that long use of DMPA injection does not have a significant association with bone mineral density,

Research conducted Gbolade*et al*[26]get a weak negative correlation between duration of use DMPA and bone mineral density, one thing that can explain this that the woman has reached steady state, known loss of bone mineral density is very significant for three years in a state hippoestrogen.

Based on these results, it is necessary periodic checks at the beginning of the use of injections of DMPA and giving calcium supplements to maintain bone mineral density as to prevent deterioration that could lead to osteoporosis, because in this study the group acceptor injection DMPA there is a decrease in bone mineral density significantly when compared with those non-acceptor DMPA injection, although still classified as osteopenia.

Age and BMI relationship with Bone Mineral Density

In Table 4 shown the relationship between age, body mass index, and duration of use of DMPA with bone mineral density in both groups. By using the Spearman rank correlation coefficient rs 0,299 value obtained for the relationship of age with bone mineral density in the study subjects, the relationship showed a significant relationship ($p < 0.05$).

In Table 4 shows that the difference in bone mineral density is very significant in the 20-24 years age group ($p < 0.001$) and age group> 35 years ($p = 0.01$), whereas significant difference was found in the age group 30-34 years with $p < 0.05$. Statistical test results found no significant difference in the age group 25-29 ($p > 0.05$). This illustrates that in the younger age groups (under 25 years) who received injections of DMPA, which experienced the highest growth of bone, it shows a decrease in mineral density were highly significant compared to the control group.

The results also found by Scholes *et al*[24] that in women younger age groups was found decreased levels of bone mineral density significantly, there is evidence suggesting that the estrogen plays an important role in the attainment of peak bone mass (peak bone mass), it seems the effect of loss of estrogen that occurs with DMPA injection contraceptive use, most common in women in the group stages of bone mass attainment of the most active, in this study was found in the age group 20-24 years.

The relationship between body mass index and bone mineral density in both study groups havers 0.121 and the value of statistical analysis showed no significant relationship ($p > 0.05$). Cundy*et al*[27] get that bone mineral density was not associated with age, parity, body mass index (BMI), calcium intake, and physical exercise.

Conclusion

There was a decrease in bone mineral density at the injection DMPA acceptor group compared with the group non-acceptor DMPA. The difference in mean bone mineral density difference between the two study groups of 0.159 g/cm^2.Older DMPA use was not associated with the BMD. There was a decrease in bone mineral density in young age group (20-24 years) who used DMPA injection.Body mass index was not associated with bone mineral density.

References

1. Saifuddin A, Affandi B, Enriquito R. A practical guide to contraceptive services. Jakarta: BinaPustaka Sarwono Foundation; 2003.
2. Surbakti S. Indonesia demographic and health survey 2002-2003. Jakarta: Health Department RI; 2003.
3. The Central Bureau of Statistics. Results of the 2005 National Survey (Cited: 25 December 2005)(3 pages).from: http//www.BPS.go.id
4. Mochtar R. synopsis obstetric. Second edition. Jakarta: EGC; 1998.
5. Hickey M, Fraser I. The contraceptive use of depot medroxyprogesterone acetate. J ClinObstet Gynecol.1995, 38:849-58.
6. Lindsay R, Cosman F. Osteoporosis: the estrogen relationship. Dalam: Swartz DP (penyunting). Hormon replacement therapy. Baltimore: Williams & Wilkins; 1992, 17-64.
7. Mosekilde L, Homsen JS. Bone structure and function in relation to aging and the menopause. Sydney: The Pathernon Publishing Group; 1996.
8. Rojansky N, Ben-Bassat H, Mariah A, Klein BY. Induction of bone formation in rat osteoprogenitor cell structure by sera of climateric women before and after HRT. FertilSteril. 1999,72:71-5.
9. Rigs BL. Pathogenesis of osteoporosis. Am J Obstet Gynecol. 1987, 156:1342-6.

10. Meschan I. Radiolucent bone disease involving bone uniformly and diffusely. In: Meschan I (penyunting). Roentgen signs in diagnostic imaging. Edisi ke-2. New York: WB Saunders Company; 1985, 199-202.
11. Edeiken J, Hodes PJ. Roentgen diagnosis of disease of bone. Baltimore: The Williams and Wilkins Company; 2000.
12. Sutton D. A textbook of radiology imaging. London: Churchill Livingstone; 1987.
13. Biben A. Effect of dietary supplementation tempe formula against formation and bone resorption in pre- and postmenopausal women. Dissertation. Bandung: FK Unpad; 2001.
14. Kanis JA, Johnell O. Pathogenesis of osteoporosis and fracture. Dalam: Kanis JA (penyunting). Osteoporosis. Edisirevisi. London: Blackwell Healthcare Communications; 1997, 124-49.
15. Speroff L, Glass RH, Kase NG. Long acting methods of contraception. Dalam: Speroff L (penyunting). Clinical gynecology endocrinology and fertility. Edisi ke-6. London: Williams and Wilkins Company; 1999, 962-7.
16. Suherman SK. Estrogen, antiestrogen, progestin and hormonal contraceptives. In: Ganiswara SG (ed). Pharmacology and therapeutics. Jakarta: Gaya Baru; 1995, 410-66.
17. SuhermMutschler E. Pharmacology and toxicology textbooks. 5th ed. Edisi ke-5. Bandung: Penerbit ITB; 1991.
18. Felig P, Frohma LA. Endocrinology and metabolism. Edisi ke-4. North America: McGraw Hill; 2001.
19. Mishel DR. Contraception. Dalam: Yen SC, Jaffe RB, Barbieri RL, (penyunting). Reproductive endocrinology. Edisi ke-4. Philadelphia: WB Sanders Company; 1999, 191-207.
20. Baziad A. Kontrasepsi hormonal. Jakarta: YayasanBinaPustakaSarwonoPrawirohardjo; 2002.
21. Changes in bone density associated with the use of hormonal methods are small and temporary (Cited: 23 December 2005)(2 page). from: http//www.agi.usa.org
22. Al-Azzawi F, Hart DM, Lindsay R. Long term effect of estrogen replacement therapy on bone mass as measured by dual photon absorptiometry. Br J ObstetGynaecol. 1987, 249:1261.
23. Adam J. Clinical approach osteoporosis symposium latest developments in the treatment of osteoporosis. Jakarta: Indonesian Osteoporosis Association; 2001.
24. Scholes D, Laroix AZ, Ott SM, Ichikawa LE. Bone mineral density in women using DMPA for contraception. Obstet Gynecol. 1999, 93:233-58.
25. Cundy T, Cornosh J, Roberts H, Reid IR. Spinal bone density in women using DMPA contraception. Obstet Gynecol. 1998, 92:569-73.
26. Gbolade B, Ellis S, Murby B, Randal S, Kirkman R. Bone density among long-term users of DMPA as a contraseptive. Br J ObstetGynaecol. 1998, 105:790-4.
27. Cundy T, Cornosh J, Roberts H, Reid IR. Menopausal bone loss in long-term users of depot medroxyprogesterone acetate contraception. Am J Obstet Gynecol. 2002, 2:978-98.

*****